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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/902,774	07/10/2001	Katsutoshi Takeda	4970/0J592	1362

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EXAMINER	
MUTSCHLER, BRIAN L	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 05/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/902,774	TAKEDA ET AL.	
	Examiner	Art Unit	
	Brian L. Mutschler	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *6* is/are allowed.

6)☒ Claim(s) *5,7 and 8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on February 6, 2004, February 26, 2004, and April 5, 2004, have been entered.

Claim Rejections - 35 USC § 112

2. Claims 5 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 recites the limitation "preparing a plurality of types of solar cell modules" in line 3. The use of the term "type" renders the claim indefinite. The same applies to dependent claim 8.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Younan et al. (U.S. Pat. No. 5,575,861) in view of Tennant (U.S. Pat. No. 4,321,416) and in view of JP 11-195803, herein referred to as JP '803.

Younan et al. disclose a method for installing a photovoltaic system for utilizing the maximum area in the installed location through the use of different sized solar cell modules (figs. 2 and 4A-4C; col. 6, line 60 to col. 7, line 10). In Figure 2, Younan et al. show a module having seven tabs **32**, each containing a sub-module, or photovoltaic device **36** (col. 5, line 42). In Figure 4A, Younan et al. show a module having three tabs **32** each containing a photovoltaic device **36**. The solar cell modules comprise shown in Figures 2 and 4A have a different number of sub-modules of an equal size. Younan et al. also disclose, "[T]he devices **36** may be interconnected in a series configuration, a parallel configuration or a mixed series-parallel configuration" and "by appropriately configuring the interconnections, current and voltage of the resultant combination may be controlled" (col. 5, lines 58-62). As shown in Figures 4A-4C, the modules can be made in various shapes and sizes, and "through the use of the variously configured members...differing areas and shapes of roofs may be effectively covered" (col. 7, lines 7-10). The modules further comprise terminal pairs **52** for connecting the output of each module to a load or power storage system (col. 7, lines 41-49). The power generating regions are separated in a direction that crosses the direction of serial connection (fig. 5).

Regarding claim 8, Younan et al. teach, "the devices **36** may be interconnected in a series configuration, a parallel configuration or a mixed series-parallel configuration" and "by appropriately configuring the interconnections, current and voltage of the resultant combination may be controlled" (col. 5, lines 58-62).

The method of Younan et al. differs from the instant invention because Younan et al. do not disclose the following:

a. The modules have an equal output voltage, as recited in claim 5.

b. Connecting positive and negative output lines of each solar cell module to positive and negative cables, as recited in claim 5.

c. The sub-modules in the modules comprise a plurality of power generating regions, and the power generating regions are connected in series or parallel so that the plurality of solar cell modules obtain an equal output voltage, as recited in claim 5.

Regarding claim 5, Tennant disclose a method for connecting solar cell modules on a roof, wherein each module has terminal leads **34, 36** connected to positive and negative output cables (bus connectors) **50, 52** in a parallel manner using conductors **60** (figs. 3 and 5; col. 3, line 49 to col. 4, line 64). The use of positive and negative output cables allows the power generated by the solar cell modules to be collected and used to power a load.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Younan et al. to connect the output terminals to positive and negative cables as taught by Tennant because connecting the

terminals to cables allows the power generated by the solar cell modules to be collected and used to power a load.

Further regarding claim 5, JP '803 teaches a method for installing solar cell modules comprising different sized modules containing different numbers of similarly sized solar cells connected in series and parallel (see English abstract). JP '803 also teaches that voltage mismatch results in a loss of output (see paragraph [0045]). JP '803 discloses the use of three modules of different sizes comprising similarly sized solar cells: the small module comprises 6 solar cells in a 1.5m x 0.2m module; the medium module comprises 8 solar cells in a 2.0m x 0.2m module; and the large module comprises 16 solar cells in a 4.0m x 0.2m module.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the output of the modules of Younan et al. to have an equal voltage output because JP '803 teaches that mismatches in voltage in connected units results in a loss of output.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the modules of Younan et al. to use a plurality of power generating regions in each sub-module as taught by JP '803 because using more power generating regions generates more power.

The use of the term sub-module does not limit the claim because it does not further limit the structure of the module. The term sub-module merely defines a level of organization, e.g., power generating regions → solar cell sub-modules → solar cell

modules. The sub-modules can be any ordered arrangement of power generating regions within the module. For example, in JP '803, the sub-module could be defined as a group of 2 solar cells. Using that definition, the small module comprises 3 sub-modules, the medium module comprises 4 sub-modules and the large module comprises 8 sub-modules.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dillard (U.S. Pat. No. 5,928,437) in view of Tennant (U.S. Pat. No. 4,321,416).

Dillard discloses a method for installing a plurality of solar cell modules, wherein the modules are different sizes and have matched voltage outputs. In one example, one module **900**, referred to as an array by Dillard, comprises 72 solar cells having dimensions of 2cm x 2cm and a second module **950** comprises 72 solar cells having dimensions of 0.25cm x 0.25cm; both modules have an output of 36 volts (col. 1, line 52 to col. 2, line 57). The modules are connected to one another in parallel (col. 8, lines 33-36). Dillard provides other examples, including an array of 72 silicon cells and an array of 45 GaAs cells, wherein each array has an output voltage of 36 volts (col. 1, line 52 to col. 2, line 12). In the first example, the modules provided in the example discussed above provide are made of 72 sub-modules and 1 sub-module, respectively, wherein the sub-module is defined as a 2cm x 2cm area. The modules have rear and front interconnects **100** and **106** for providing series and parallel electrical connections between the individual solar cells (col. 4, lines 38-40). As shown in Figure 10, power generating regions are separated in a direction crossing the direction of series

connection and in a direction that does not cross the direction of series connection (fig. 10).

The method of Dillard differs from the instant invention because Dillard does not disclose connecting the positive and negative output lines of each module to positive and negative cables, as recited in claim 5.

Tennant disclose a method for connecting solar cell modules on a roof, wherein each module has terminal leads **34, 36** connected to positive and negative output cables (bus connectors) **50, 52** in a parallel manner using conductors **60** (figs. 3 and 5; col. 3, line 49 to col. 4, line 64). The use of positive and negative output cables allows the power generated by the solar cell modules to be collected and used to power a load.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dillard to connect the output of the modules to positive and negative cables as taught by Tennant because connecting the output of the modules to cables allows the power generated by the solar cell modules to be collected and used to power a load.

The terms "sub-module" and "power generating region" are terms defining arbitrary regions within the module and have no specific structure as recited in the claims. The terms are interpreted to encompass any possible configuration of the solar cells within each module.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Admissions of prior art made in the instant specification in view of JP 10-082152, herein referred to as JP '152.

The instant specification describes a known solar cell module comprising a metal base **111**; two solar cell sub-modules **112** mounted on the base **111**; a raised portion **122** having a first engagement section **121** at its end; a suspended portion **124** having a second engagement section **123** that comes into engagement with the first engagement section **121**; a base section **125** on the raised portion **122** parallel to the base **111**; and wiring members sealed in a resin layer (see page 3, line 5 to page 5, line 1 and Figure 3).

The prior art module disclosed in the instant specification differs from the instant invention because the connection is not made between the base section and the base of the raised portion.

JP '152 discloses a solar cell module comprising a base, a suspended portion and a raised portion, wherein the raised portion has a section parallel to the base (figs. 1 and 2). The electrical connection is made between the section of the raised portion parallel to the base and the base, wherein "rain infiltration is more surely prevented" (see English abstract and Figure 2).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the connection in the prior art module disclosed in the instant invention to be between the parallel section of the raised portion and the

base as taught by JP '152 because positioning the connection underneath the raised portion helps prevent the infiltration of rain.

Response to Arguments

7. Applicant's arguments filed September February 6, 2004, have been fully considered but they are not persuasive.

8. Regarding the rejection of claim 5 over Younan et al. in view of Tennant and JP '803, Applicant argues, "There is not the slightest suggestion that equal output voltage could be obtained even with solar cell modules of different sizes" (see page 5 of Applicant's response). Applicant further argues that the cited references do not teach or suggest the claimed method of separating the power generating regions (see page 5 of Applicant's response).

9. These arguments are not persuasive because the cited references provide the motivation to combine the methods. Younan et al. disclose a method of installing solar cells and teaches, "By appropriately configuring the interconnections, current and voltage of the resultant combination [i.e., the solar cells **36** within the modules **26**] may be controlled" (see US '861 at col. 5, lines 60-62). JP '803 teaches that mismatch of string (=module) voltages causes a loss of output (see JP '803 at par. [0045]). Therefore, one skilled in the art would have been motivated to match the voltages of the modules in Younan to prevent the output losses due to voltage mismatch, because JP '803 teaches that voltage mismatches lead to output losses. Even though JP '803

teaches that the loss is offset be larger gains through other means, there is still a loss of efficiency. One skilled in the art would have realized that avoiding the losses due to voltage mismatch would have increased the output, thus improving the efficiency by minimizing losses.

10. One skilled in the solar cell art would have a minimum of an electrical engineering degree and a knowledge of fundamental circuit properties. This knowledge includes an understanding of power sources arranged in series and parallel. It is also noted that the size of the module itself does not affect the voltage output. The voltage output is dependent on the number of individual solar cells, the material they are made of, and the interconnections between the cells.

11. Regarding Applicant's second argument, the Applicant has not claimed a method of separating the power generating regions. The claim recites a method for installing a plurality of solar cell modules and provides the steps of preparing different-sized, equal-output modules and connecting positive and negative output lines of each solar cell module to cables. The limitation that the "power generating regions being separated" is not a positive process limitation.

12. Regarding the rejection of claim 5 over Dillard in view of Tennant, Applicant argues, "[T]here is no teaching o suggestion that power generated regions be connected in the claimed manner or that they could be connected to achieve the same output voltgge even when the modules are different sizes" (see page 5 of Applicant's response).

13. This argument is not persuasive because Dillard clearly teaches, "The microarrays can be used alone or in conjunction with conventional space power arrays since the microarrays are voltage matched for parallel connection with conventional arrays" (see US '437 at col. 8, lines 33-36). Therefore, Dillard is deemed to teach the connection in parallel of arrays having different sizes and equal voltage outputs. In the example shown in Figure 9 and described at column 7, line 41 to column 8, line 44, Dillard clearly teaches connecting two different sized arrays **900, 950** having different sizes and equal outputs.

14. Regarding the rejection of claim 7, Applicant argues the positioning of the wiring member is entirely different from the claimed position (see page 6).

15. The argument is not persuasive because Applicant's admissions of prior art teach the use of sealing wiring members to electrically connect adjacent solar cell sub-modules within a module, and JP '152 teaches that the wiring member should be placed underneath the horizontal portion (base section) of the raised portion to protect the wiring member from rain infiltration. Thus, the repositioning of the wiring member to be protected underneath the base section of the raised portion would have been obvious to one skilled in the art.

Allowable Subject Matter

16. The following is a statement of reasons for the indication of allowable subject matter: Claim 6 is distinguished over the prior art of record because the prior art of

record neither teaches nor suggests a solar cell comprising a supporting member, a plurality of solar cell sub-modules mounted on the supporting member, wherein each of the sub-modules include a glass substrate and a plurality of solar cells on the substrate, and a wiring member connecting adjacent sub-modules, wherein the wiring member is covered by a moisture impermeable cover and sealed in a resin between the supporting member and the cover member. While Hanoka teaches an apparatus comprising a plurality of solar cells mounted on a glass substrate and connected by a wiring member sealed within resin, Hanoka does not teach the use of a plurality of glass substrates and wiring members sealed in resin between a cover and supporting member to connect adjacent arrays. The instant invention would improve the weather-resistance of solar cell arrays by providing modules having a plurality of sub-modules with wiring members sealed beneath a moisture impermeable cover.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (571) 272-1341. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

blm
May 12, 2004

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